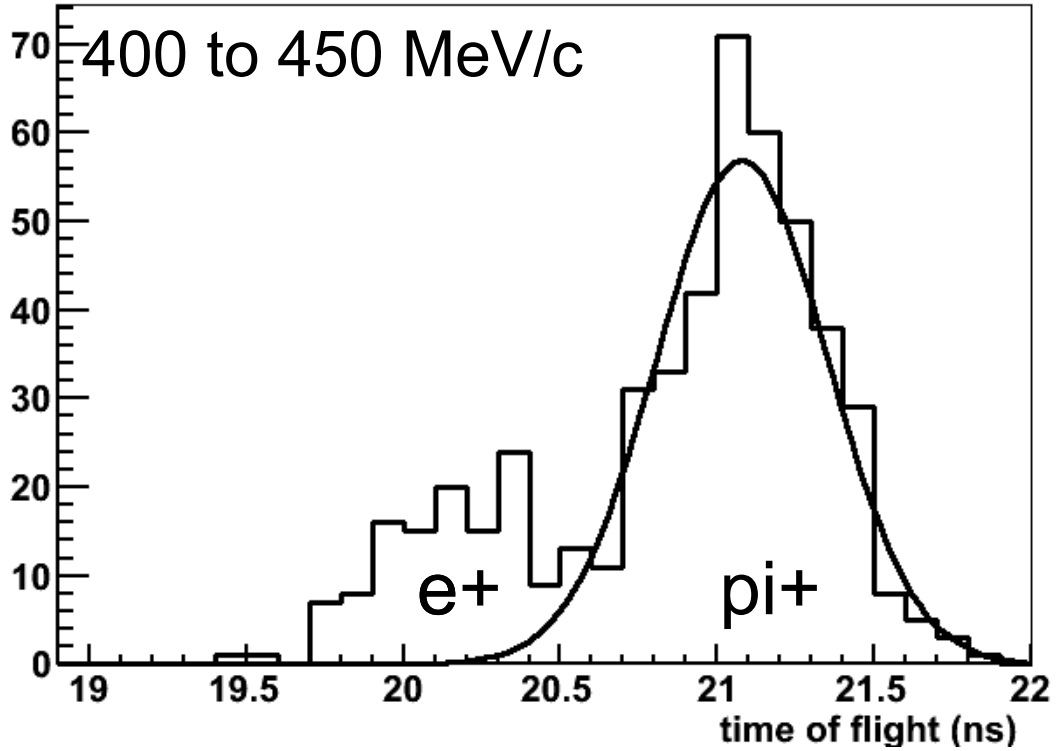
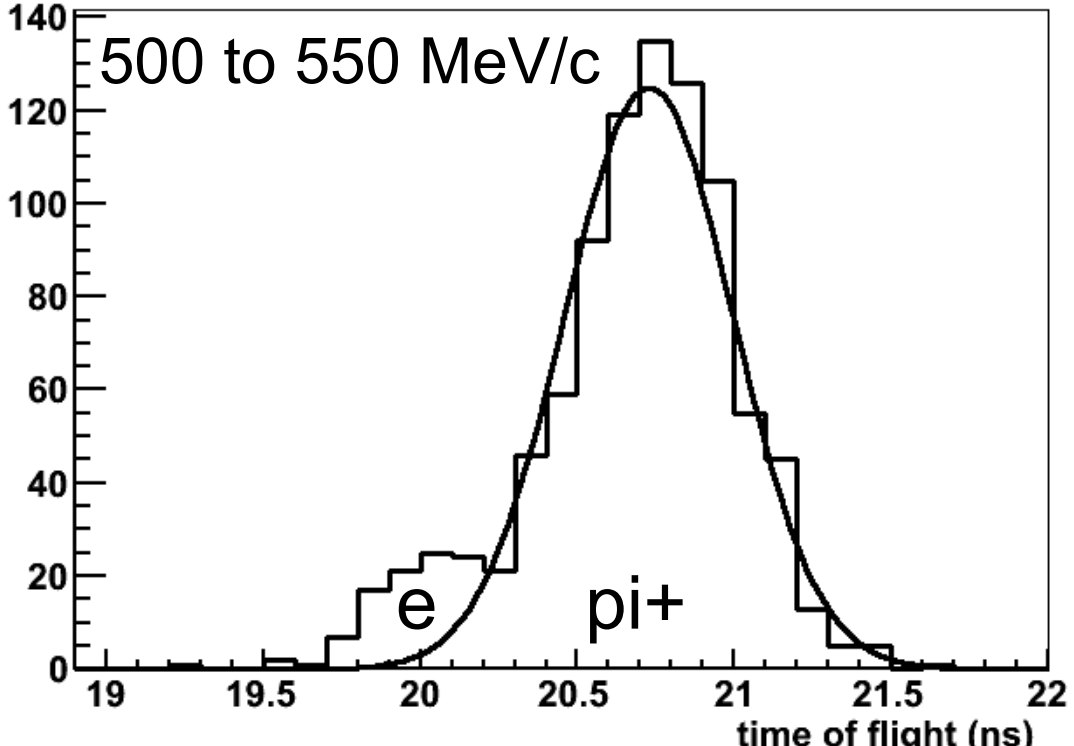
electron:pion ratio
and possible LArIAT momentum spectra
extracted from MINERvA/T977 beam data

Rik Gran, December 2012





Positron content

Positive polarity beam electrons and pions separated by TOF.

TOF resolution 200ps

Selection is after aggressive, high purity hardware rigger and clean WC reco.

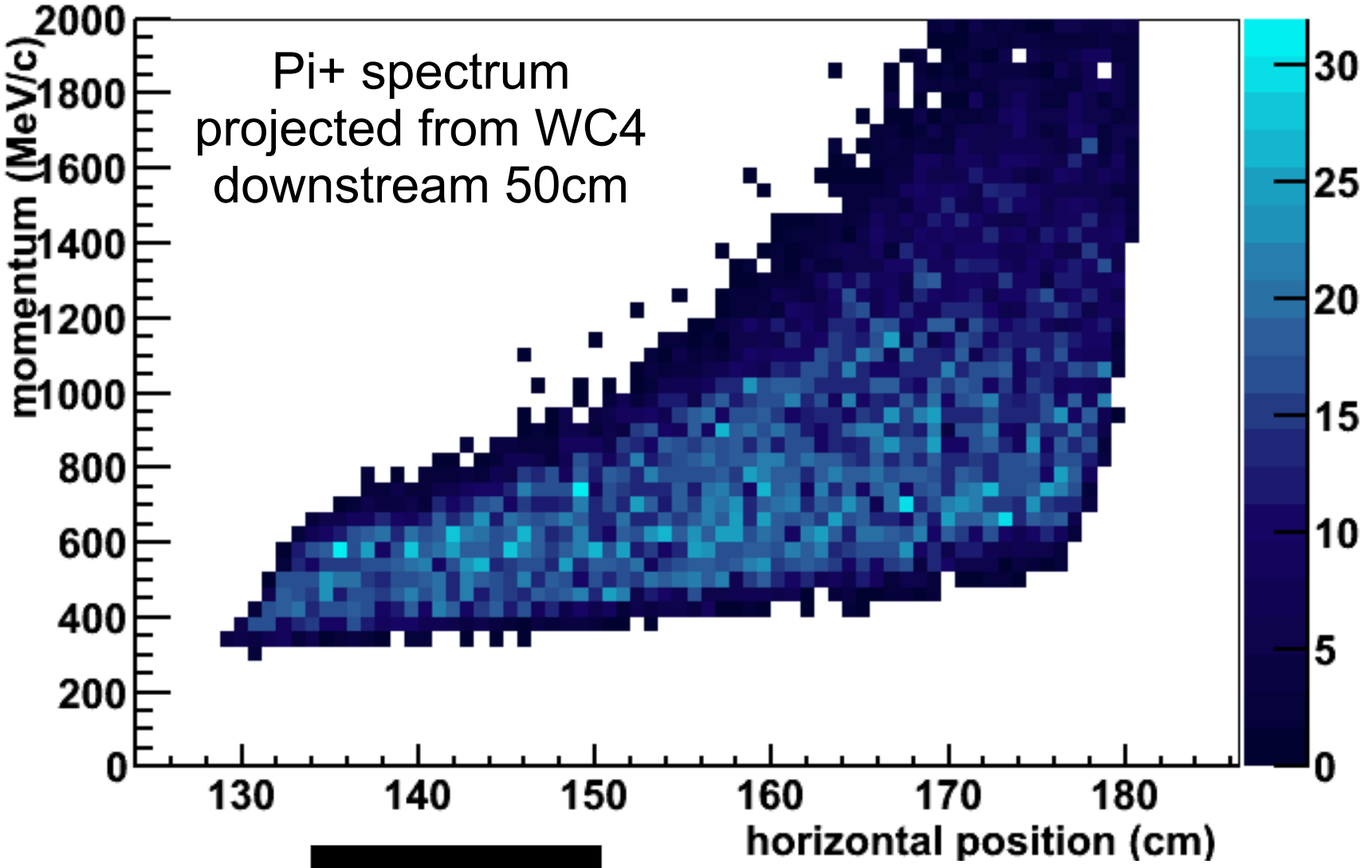
Eliminates cases where multiple particles were hitting WC's and bad reco p fits

Summary of electron:pion ratio

Momentum range	e:pi
< 400 MeV/c	0.53
400 to 450 MeV/c	0.29
450 to 500 MeV/c	0.14
500 to 550 MeV/c	0.09
550 to 600 MeV/c	0.08

Above 600, our TOF resolution is not good enough to know.
But we had a simulation that seemed to confirm that the electromagnetic content of the triggers continued to decrease as we went up in energy.
The simulation included the trigger-like requirement
One and only one particle traverses the beam instrumentation.

Horizontal beam profile 50cm down from WC4



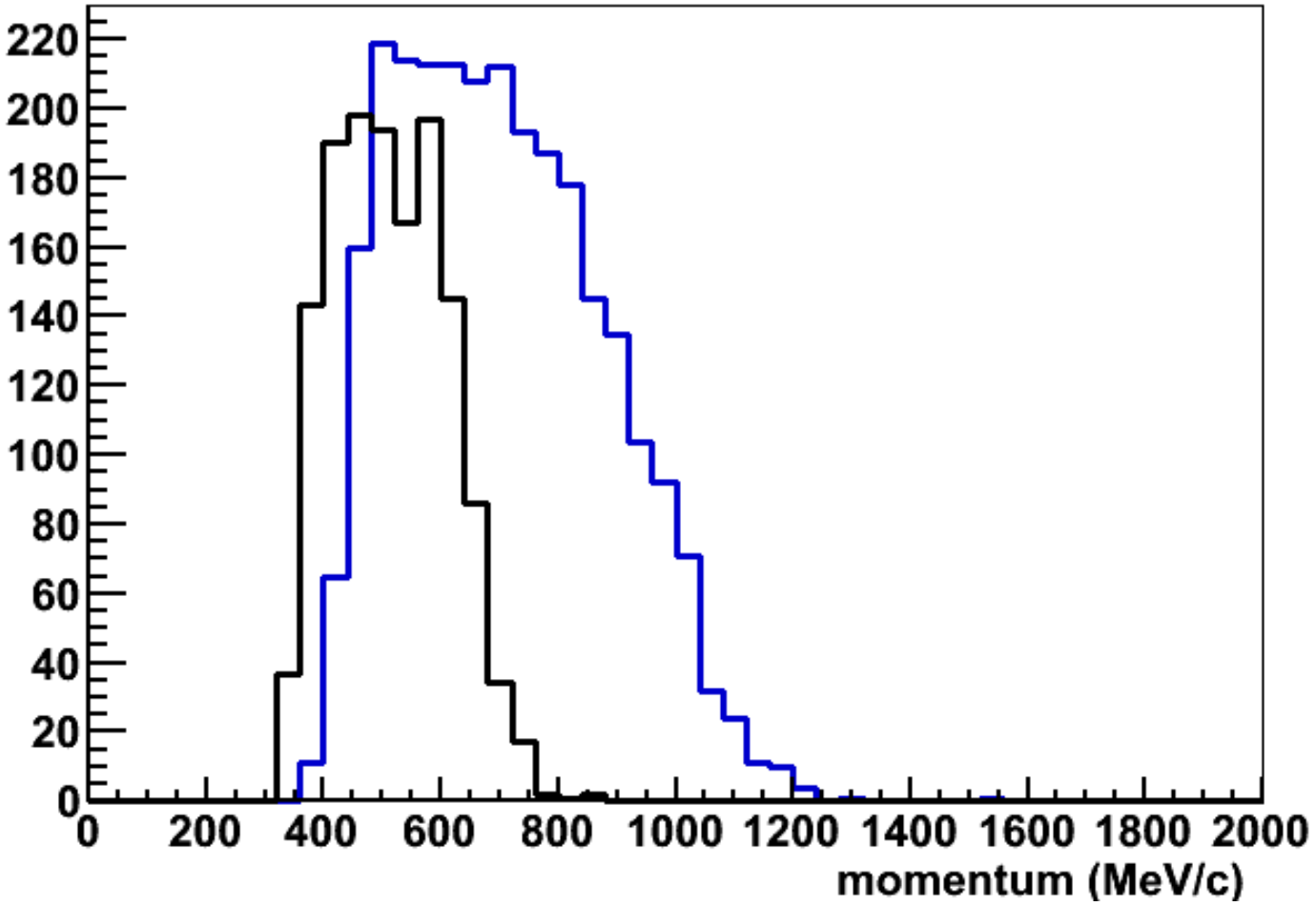
6 inch aperture

center at
138 cm

center at
155 cm

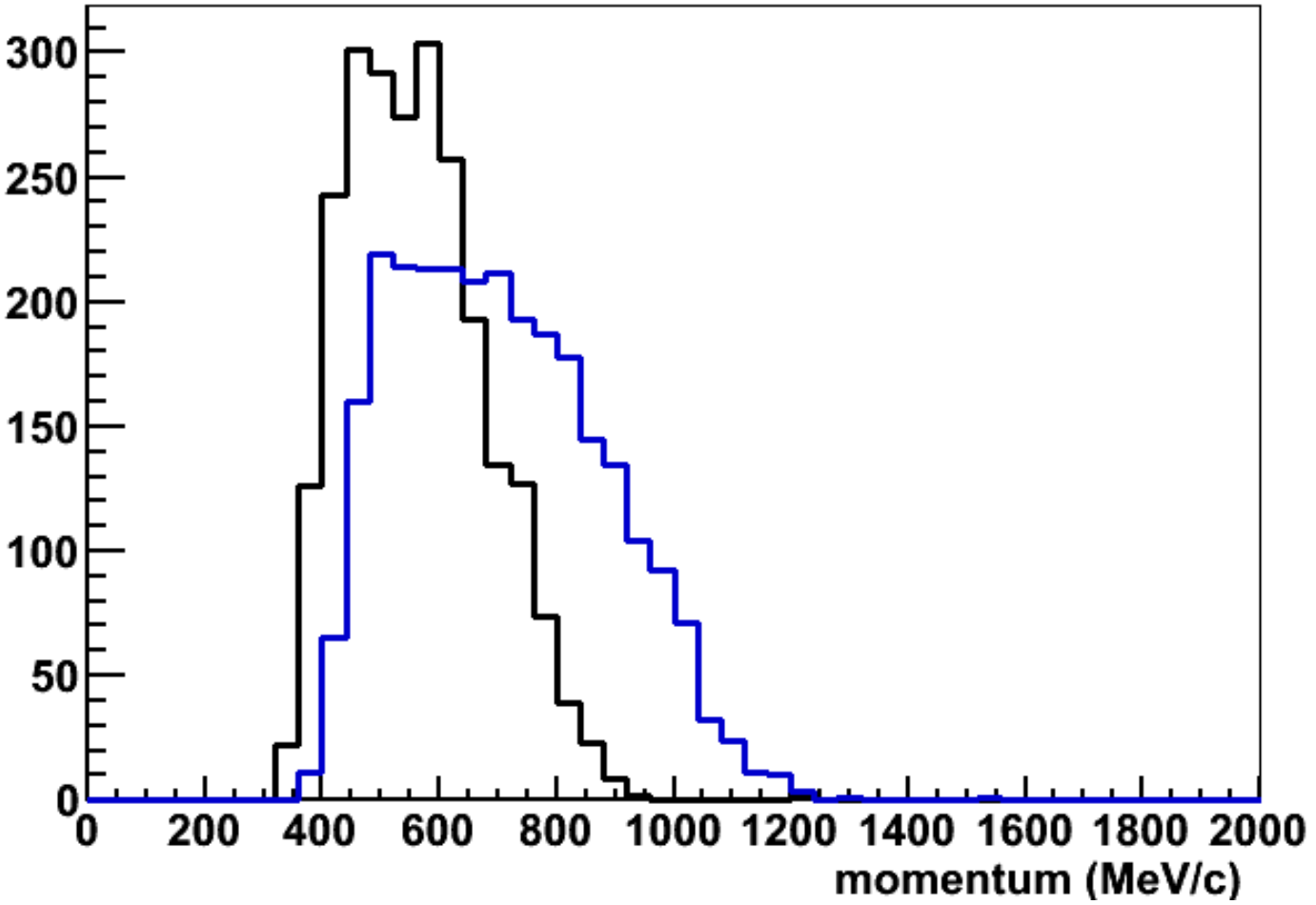
Imagine placing Argoneut detector at these two places

Pion momentum profiles at 138 cm and 155 cm



Blue is measured and projected to 155 cm
Black is measured and projected to 138 cm
Though really we want to change magnet field, not move the detector (next slide)...

Pion momentum profiles at 155 cm, two B fields



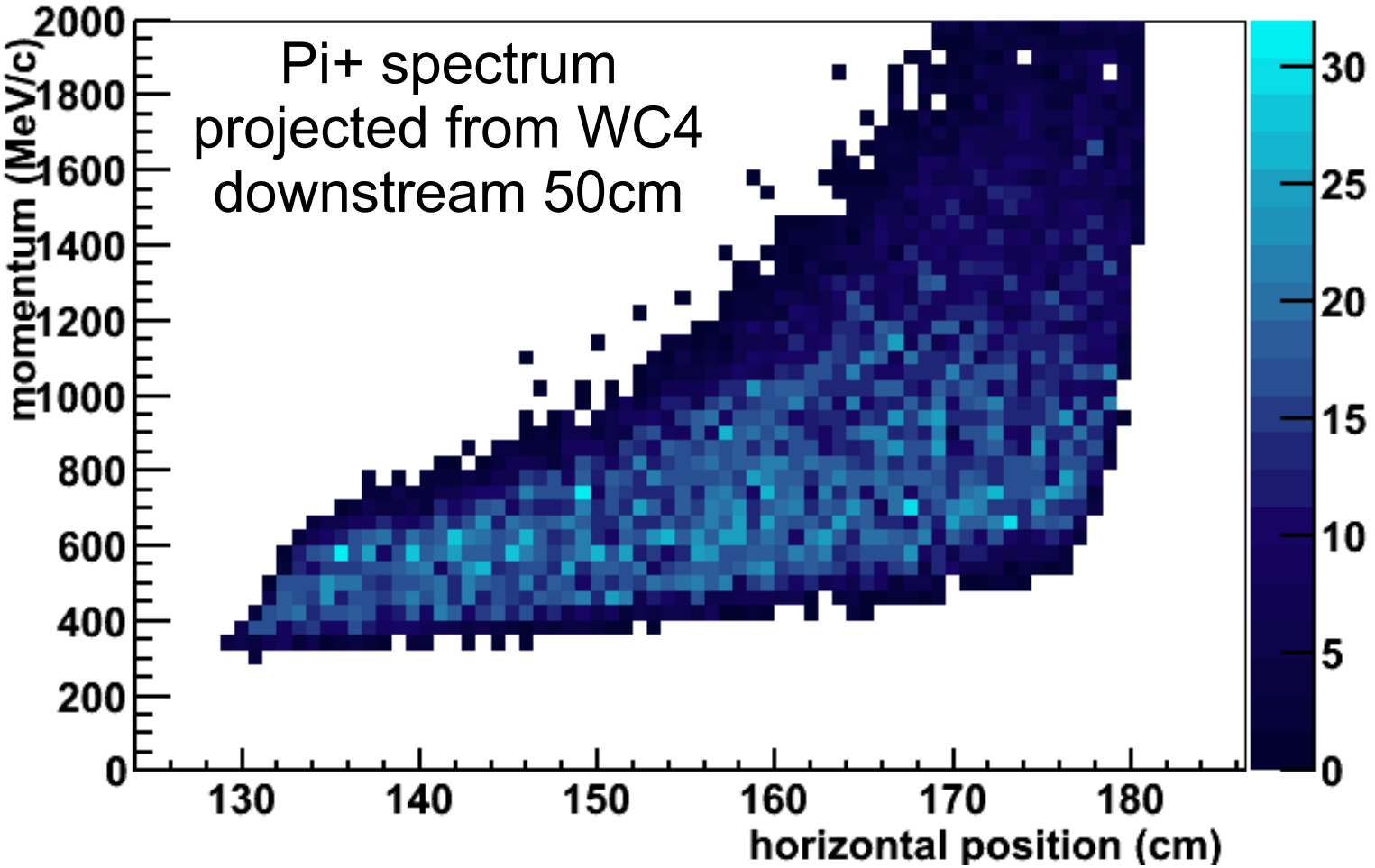
Blue is measured and projected to 155 cm.
Black is same projection, but simple geometrical scaling that corresponds to dropping Pt kick from 115 to 80 MeV/c
Protons are similar. Our data doesn't allow me to go lower.

Momentum resolution

Resolution 1.4% to 1.2% for pions

3% to 1.4% for protons

The higher number is from multiple scattering



For us, transition from multiple scattering to WC wire pitch to drive resolution for pions happens at 500 MeV/c, for protons at 1500 MeV/c. Technically that is position dependent for us, but I think it will be close even if we put the detector at 155, more wire-pitch driven at 160 and 165.